

gases obey Boyle's law exactly, the author gave a description of the apparatus he had employed in making such determinations, which allowed the use of considerable volumes of these gases. The results obtained show the ratio not to be exactly that of 1 vol. of oxygen to 2 vols. of hydrogen; but the proportions are 1 : 1'994 or 1 : 1'9935; or, if the impurity be supposed to exist in the oxygen alone, then the ratio is 1 : 1'996. The gases were examined as to their purity, the results indicating the presence of '2 c.c. to '3 c.c. of foreign gas in the 450 c.c. used.

In a communication entitled *On Solutions of Ozone and the Chemical Action of Liquid Oxygen*, Prof. Dewar gave a description of the apparatus and method employed by him in the liquefaction of such gases as oxygen, &c., and after discussing the conditions required for the successful conversion into the liquid state of the so-called permanent gases, he gave an account of some experiments made with liquid oxygen. At -130° liquid oxygen loses the active characters possessed by this element in the gaseous state; it is without action on phosphorus, sodium, potassium, solid sulphuretted hydrogen, and solid hydriodic acid. Other substances appear to undergo similar changes at very low temperatures; thus liquid ethylene and solid bromine may be brought in contact without any action taking place, whereas gaseous ethylene and liquid bromine unite directly at the ordinary temperatures. Hautefeuille and Chapuis by subjecting a mixture of carbonic anhydride and ozone to great pressure obtained a blue liquid, the colour of which is due to the ozone. If ozonised air be passed into carbon disulphide at -100° , the liquid assumes a blue colour, which disappears if the temperature be allowed to rise, and at a certain point a decomposition, resulting in the production of sulphur, takes place. The best solvent for ozone is a mixture of silicon tetrafluoride and Russian petroleum. These solutions of ozone are without action on metallic mercury or silver. Prof. Dewar, in remarking on the liquefaction of nitric oxide, stated that a comparison of its curve of liquefaction with that of methane shows the pressure to increase more rapidly with the temperature in the case of nitric oxide than in other gases, a fact which would appear to indicate, that at low temperatures the molecule of nitric oxide is of greater complexity, and probably exists as N_2O_3 . An account was given of some of Cailletet's experiments on the electrical conductivity at low temperatures, which seemed to indicate that as the limit -220° was approached ordinary electrical conductors become almost perfect conductors.

On the use of Sodium or other Soluble Aluminates for Softening and Purifying Hard and Impure Water, and Deodorising and Precipitating Sewage, Waste Water from Factories, &c., by F. Maxwell Lyte, F.C.S., F.I.C.—The advantages attending the use of sodium or other soluble aluminates for the above purposes are dependent upon their easy decomposition with the production of a precipitate of hydrated alumina, which removes organic matter, and further by their use the temporary hardness may be completely destroyed, and the permanent hardness reduced.

Some New Crystallised Combinations of Copper, Zinc, and Iron Sulphates, by J. Spiller, F.C.S.—The author gave an account of the preparation of a large series of double sulphates of copper and iron, zinc and iron, and copper and zinc.

In a communication on *Barium Sulphate as a Cementing Material for Sandstone* Prof. Clowes pointed out that, although Bischof mentioned instances of foreign sandstones in which the material cementing the sand grains together was barium sulphate, it appeared that up to the present time no such sandstone had been met with in the United Kingdom. Having learned that opinions differed regarding the calcareous nature of certain new red sandstone beds in the neighbourhood of Nottingham, he undertook to examine the chemical composition of these sandstones, and procured specimens of the sandstone from different levels. On being analysed, the sandstone was found to contain barium sulphate in varying proportions, at present being determined, while some of the lower beds also contained calcium carbonate. In some of the sandstone beds the barium sulphate was very unequally distributed, forming a network or a series of small masses more or less spherical in shape. In such sandstone the sand grains between the sulphate streaks and patches were quite loose, the result being that the weathered surface presented a honeycombed appearance. To explain the presence of the barium sulphate he suggested that it might have been deposited along with the sand; but if such had been the case it had certainly undergone a physical change, as it now existed in a firm, compact, and crystalline condition. It

would, therefore, appear that it had been either deposited from aqueous solution or that it had been rendered crystalline by a slow percolation of a solvent liquid through the sedimentary deposit, or owed its origin to the action of water containing calcium sulphate passing through sandstone cemented originally with barium carbonate.

NOTES

BOTANISTS will learn with very great regret of the death of Mr. Edmond Boissier, the learned and indefatigable author of the "*Flora Orientalis*," and many other important works on Systematic Botany. We have received no particulars, but we imagine his death must have been somewhat sudden, for the event was quite unexpected by his friends in this country. As recently as the month of August Prof. Oliver heard from him, the communication relating to the Supplements to the "*Flora Orientalis*," on which the deceased botanist has been for some time engaged, and in which he wished to incorporate the botanical results of Dr. Aitchison's latest investigations in Afghanistan. Boissier's career as a botanist may be said to have commenced with his travels in Spain in 1837, when he collected the materials published in his "*Voyage Botanique dans l'Espagne*," a richly illustrated work which appeared at intervals from 1839 to 1845. He subsequently travelled and botanically explored various parts of South-eastern Europe and Asia Minor. Independently of his larger works he published, separately, diagnoses of the exceedingly large number of undescribed species he found from within the limits of his "*Flora Orientalis*," the first volume of which appeared in 1867, and the last in 1881. This work alone is sufficient to place the author in the first rank of a school of distinguished systematists, now alas fast disappearing without leaving a corresponding rising generation to take up the work where they have left it. Like the late Mr. Bentham, M. Boissier was in a position to give his undivided attention to the science he had chosen, and like him he laboured unceasingly; and it is to be hoped that the supplement to the "*Flora Orientalis*" is in a sufficiently forward state for publication. Among other things the vast genus *Euphorbia* furnished materials for several valuable works, including a monograph of all the species, and a folio volume containing figures of 120 species. Mr. Edmond Boissier was a Foreign Member of the Linnean Society, having been elected in 1860: and from his constant readiness to give others the benefit of his extensive knowledge, he enjoyed the esteem and admiration of a wide circle of botanists.

THE death is announced, at the age of seventy-eight years, of Mr. John Muirhead, one of the very few survivors of the early days of telegraphy, and closely connected with its practical development. Mr. Muirhead, in conjunction with Mr. Latimer Clark and Mr. W. M. Warden, of Birmingham, founded the house now known as Latimer Clark, Muirhead, and Co., more than a quarter of a century ago. It was from this manufactory that Mr. Muirhead introduced the form of battery which bears his name, a form so eminently portable and practical that it has become the model for most of the existing batteries, while continuing itself to be largely employed.

A *Times* telegram dated Philadelphia, September 27, states that the President of the United States has asked Prof. Alexander Agassiz to accept the post of Superintendent of the Coast Survey.

A REMARKABLE memoir on the development of the sternum in birds, prepared by Miss Beatrice Lindsay, of Girton College, and communicated to the Zoological Society of London by Dr. H. Gadow at their meeting on June 16 last, will appear in the forthcoming number of the Society's *Proceedings*. Miss Lindsay,

after close investigation of the embryonic condition of different stages in five types of bird-structure (the ostrich, guillemot, gull, domestic fowl, and gannet), has come to the conclusion that the keel of carinate birds is a special outgrowth of the true sternum peculiar to birds, and is not homologous with the episternum or interclavicle of reptiles, as has been held by Götte and others. There are no traces whatever in the embryonic stages of the ostrich, according to Miss Lindsay's observations, of the existence of any rudiments of the clavicles or keel. It follows that the view held by some morphologists that the ostrich may be a degraded descendant of some carinate form can no longer be supported.

THE Edinburgh International Industrial Exhibition will be opened on May 4 next.

A CORRESPONDENT of the *Times* in a recent article on the new Electorate, describes the fishermen at Staiths, a village on the Yorkshire coast, lying between Whitby and Saltburn. The people, he says, are imbued with all manner of quaint superstitions. They have a firm belief in witchcraft, the witch being wholly unconscious of his or her power of evil. Until recently—and it is said that the custom is still secretly maintained by some of the older inhabitants—it was customary, when a smack or coble had had a protracted run of ill-fortune, for the wives of the crew and owners of the boat to assemble at midnight, and, in deep silence, to slay a pigeon, whose heart they extracted, stuck full of pins, and burned over a charcoal fire. While this operation was in process the unconscious witch would come to the door, dragged thither unwittingly by the irresistible potency of the charm, and the conspirators would then make her some propitiatory present. Again, it is of frequent occurrence that, after having caught nothing for many nights, the fishermen keep the first fish that comes into the boat and burn it on their return home as a sacrifice to the Fates. All four-footed animals are considered by the Staiths folk as unlucky, but the pig is the most ill-omened of quadrupeds. If when the men are putting their nets into the boats the name of pig is by accident mentioned, they will always desist from their task and turn to some other occupation, hoping thus to avert the evil omen, and in many cases will renounce the day's expedition altogether. The sight of a drowned dog or kitten, too, as he goes towards his coble will always keep a Staiths fisherman at home; and, what is still more curious, if as he walks to his boat, his lines on his head or a bundle of nets on his shoulder, he chances to meet face to face with a woman, be she even his own wife or daughter, he considers himself doomed to ill-luck. Thus, when a woman sees a man approaching her under these circumstances she at once turns her back on him. If a fisher sends his son to fetch his big sea boots, the bearer must be careful to carry them under his arm. Should he by inadvertence place them on his shoulder his father will inevitably refuse to put out to sea that day. An egg is deemed so unlucky that the fishermen will not even use the word, but call it a roundabout; and, fearless as are the fishers in their daily struggling with the dangers of the sea, yet so fearful are they of nameless spirits and bogies that the writer was assured he could not find in the whole fishing colony of Staiths a volunteer who for a couple of sovereigns would walk by night to the neighbouring village, a couple of miles distant.

WE have received the report of Miss Pogson, the meteorological reporter to the Government of Madras, for the year 1884-85. It contains remarks on the various stations scattered over the Presidency, together with the usual tables. Part of the observer's work is to train learners, who afterwards take charge of the local stations. One of these, it is interesting to notice, is on the Laccadives, which islands are inaccessible during a great part of the year. The assistants in most cases are native officials.

ALL the legal steps have been taken by the French Government for entering into possession of the late M. Giffard's fortune, which is to be devoted to the good of science. The fortune is valued at 200,000*l.*, after paying about 100,000*l.* in legacies to friends, family, or scientific societies. The decree is ready and will shortly appear in the *Journal Officiel*. Several projects have been proposed already for utilising this large sum of money, but it is very likely nothing will be done before taking the advice of the French Academy of Sciences.

ON September 12, just after sunset, a remarkable mirage was seen at Valla, in the province of Sudermania, Sweden. It appeared first as a great cloud-bank, stretching from south-west to north, which gradually separated, each cloud having the appearance of a monitor. In the course of five minutes one had changed to a great whale blowing a column of water into the air, and the other to a crocodile. From time to time the clouds took the appearance of various animals, and finally that of a small wood. Subsequently they changed to a pavilion, where people were dancing, the players being also clearly visible. Once again the spectacle changed, now into a lovely wooded island with buildings and parks. At about nine o'clock the clouds had disappeared, leaving the sky perfectly clear. The air was calm at the time of the display, the temperature being 6° C.

THE aquarium at the Inventions Exhibition has lately been entirely restocked, the latest arrivals being a fine selection of bass weighing 10 lbs., some large specimens of Crustaceans, and an assortment of flat-fish of all descriptions. There is also on view a diversified collection of foreign freshwater fish presented by the General Import Company.

CAPT. VIPAN's aquarium of foreign fishes at Stibbington Hall, Wansford, is a most valuable one, and includes unique and rare specimens of fish from all parts of the world, which are retained with the utmost care, the temperature of the water being regulated to suit the natural necessities of the various fish. This aquarium is considered to be one of the most unique in the United Kingdom, and increases in value annually on account of periodical additions to the collection.

THE taxidermist who has had charge of the work upon the body of "Jumbo," who was recently crushed between two trains, states that the elephant's stomach contained many English coins—gold as well as silver and bronze. His tusks had by the collision with the train been driven nearly through the skull. According to later accounts as to the accident, Jumbo at the last moment faced and charged the locomotive. The elephant's skin was found to be an inch and a half thick, and it weighed 1537 lbs. The skeleton weighs 2400 lbs., and the total weight of the body was over 6 tons.

MESSRS. SWAN SONNENSCHNEIN AND CO. announce, for the season 1885-6, the following publications:—"A Treatise on Animal Biology," by Prof. Adam Sedgwick, Fellow and Lect. of Trin. Coll., Camb. (illustrated); "Practical Botany," by Prof. Hillhouse, of Mason Coll., Birm., based upon the work of Prof. Strasburger (largely illustrated); a translation of Profs. Nägeli and Schwendener's work, "The Microscope in Theory and Practice," with several hundred woodcuts; an "Alpine Flora," a pocket handbook for botanists and travellers, by Mr. A. W. Bennett, B.Sc., M.A.; an illustrated "Handbook of Mosses," by Mr. J. E. Bagnall; a "Star Atlas," by the Rev. T. H. Espin; further parts of Mr. Howard Hinton's "Scientific Romances"; an entirely new and partly re-written edition of Prof. Prantl and Vines's "Text-Book of Botany"; "From Paris to Peking over Siberian Snows," an account of the Asiatic wanderings of M. Meignan, by Mr. William Conn; "The Wanderings of Plants and Animals," an adaptation from the German work of Prof. Victor Hehn, by Mr. James Stally-

brass, tracing (chiefly by means of etymology) the history and the migration of European plants and animals to their home in Asia.

MESSRS. CROSBY LOCKWOOD AND CO. make the following announcements for the approaching publishing season:—"Electro-Deposition," by Alexander Watt, author of "Electro-Metallurgy"; "The Prospector's Handbook, a Guide for the Prospector and Traveller in Search of Metal-bearing or other valuable Minerals," by J. W. Anderson, M.A., F.R.G.S.; "The Engineman's Companion, a Practical Educator for Enginemen, Boiler Attendants, and Mechanics," by Michael Reynolds; "The Combined Number and Weight Calculator," by Wm. Chadwick, Public Accountant; "Our Temperaments, their Study and their Teaching, a Popular Outline," with illustrations, by F.R.C.S.E.; "The Artist's Tables of Pigments," by H. C. Standage; "Land and Marine Surveying," by W. Davis Haskoll (entirely new edition); "The Metal Turner's Handbook, a Practical Manual for Workers at the Foot Lathe," by Paul N. Hasluck (second edition, revised), being the first volume of a new series of "Handbooks on Handicrafts."

THE "Sun" Knife-cleaner has some points which deserve notice. It is supported on a light cast-iron standard, the upper portion of which is bored out and faced to make the bearing where alone perfect fit is required. A cast-iron spindle is fitted into this bearing, and supports upon a flattened face two spring disks made of cast steel finely tempered, dished in the centre and having rays upon them like the spokes of a wheel, which turn slightly outwards at their ends, so as to form a tapered space adapted to the wedge form of the length of the knife. These springs are so mounted upon the spindle that the rays of the one are opposite to the space, between the rays of the other. The spindle is terminated by a screw upon which a thumb nut is fixed to hold the handle in position and keep the working parts together. By means of this screw the springs can be pressed more or less closely together as required. Leather rings are riveted to the inner faces of the springs, and form the surfaces upon which the knives are cleaned and polished; the rivets are in the dished portion of the springs and so out of the way of the knife-blade; the polishing powder is supplied through a hole in the face of the front spring. The knife whilst being cleaned is supported below a wrought-iron piece cast into the standard and passed in and out of the machine. The difficulty in cleaning a knife is due to its double wedge form. A knife is a long wedge from the tip to the shoulder, and a short wedge from the edge to the back, and it is evident that the pressure brought to bear upon it must be of an elastic character, so as not to grind the knife away. As regards the length of the knife this is effected by the outward taper of the rays of the springs. The two leather rings between which the blade is passed in and out being pressed against the blade of the knife by the rays of the springs as described, it is evident that there is an elastic pressure upon it; the spring on the one side diminishes in its bearing pressure, as that on the other side increases, and hence an equable pressure is applied to all parts of the blade, as is proved by the excellent polish produced. A small portion of powder being supplied through the hole in the front spring, the knife is placed with its edge downwards below the wrought-iron support and passed slowly in and out of the machine between the leather disks with the left hand, whilst the right hand is employed in turning the handle of the machine in the direction of the hands of a clock. In this way from one inch to two inches in depth of the surface of each leather (depending upon the size of the machine) presses elastically upon the blade. This being the greatest frictional resistance at any moment between the blade and the polishing surfaces, the labour of cleaning is reduced to a minimum, while the knife can be polished to the shoulder owing

to the leathers being bevelled. Special tools have been designed for cutting and bending the wrought-iron supports in one operation, for cutting and bevelling the leathers, and riveting and fitting them to the springs. These machines are supplied in four sizes.

IN contrast to the weather in Southern Norway during May and June (NATURE, vol. xxxii. p. 354) the weather of July was warmer and more normal, the mean temperature of the month—viz. 17.1° C. being 0.5° above the normal, 16.6° . This is chiefly due to the southern winds prevailing in the first part of the month. On July 21, however, the weather changed, northern and north-western winds prevailing, with clear and dry air, and in consequence of the great radiation, the temperature fell several times very low during the second part of the month. The minimum temperature—viz. 6.4° C.—was registered at Christiania on the night of the 22nd., and the highest—viz. 29° C.—on the 6th. The rainfall was 40 per cent. below the normal. With the exception of the coast towards the Naze, the month has been cold throughout the land on the whole, the most unfavourable parts being the west coast, where the temperature was 1° C. below the normal mean. In the mountains and in East Finnmarken it sank several times below 0° . The rainfall in the southern and eastern parts was below the average, but in the northern and north-western parts it was above it. The greatest rainfall was registered in Finnmarken, where, in Alten, for instance, it was 142 per cent. above the average.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Mrs. Paterson; a Humboldt's Lagothrix (*Lagothrix humboldti*) from the Upper Amazons, presented by Mr. F. J. Hammond; two Macaque Monkeys (*Macacus cynomolgus*) from India, presented respectively by Mr. F. Debenham and Miss Lucy McArthur; two West Indian Agoutis (*Dasyprocta cristata*), seven Crab-eating Opossums (*Didelphys cancrivora*), two Rough Terrapins (*Clemmys punctularia*), two Brazilian Tortoises (*Testudo tabulata*), two Teguxin Lizards (*Teius teguxin*), two Tuberculated Iguanas (*Iguana tuberculata*), nine Giant Toads (*Bufo aqua*) from Trinidad, presented by Mr. F. J. Guy; two Palm Squirrels (*Sciurus palmarum*) from India, presented by Mr. A. Bellamy; a Great Kangaroo (*Macropus giganteus* ♂), a Rufous Rat Kangaroo (*Hyposiprymnus rufescens*) from New South Wales, a Roan Kangaroo (*Macropus erubescens* ♀) from South Australia, presented by Mr. C. Czarnikow, F.Z.S.; a Common Crossbill (*Loxia curvirostra*), British, presented by Mr. H. S. Eyre; a Green Lizard (*Lacerta viridis*) from Jersey, presented by Mr. G. V. Colliver; a Guinea Baboon (*Cynocephalus sphinx*) from West Africa, two Bonnet Monkeys (*Macacus sinicus*) from India, two Aelian's Wart Hogs (*Phacocheirus africanus* ♂♂) from Africa, deposited; a Garnett's Galago (*Galago garnetti*) from East Africa, a Harnessed Antelope (*Tragelaphus scriptus* ♀), an Elate Hornbill (*Ceratogymna elata*) from West Africa, a Puff Adder (*Vipera arietans*) from South Africa, a Lacertine Snake (*Celopeltis lacertina*), European, an Aldrovandi's Lizard (*Plestiodon auratus*) from North-West Africa, purchased; a Leopard (*Felis pardus*), born in the Gardens.

ASTRONOMICAL PHENOMENA FOR THE WEEK, 1885, OCTOBER 4-10

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on October 4

Sun rises, 6h. 8m.; souths, 11h. 48m. 37.5s.; sets, 17h. 29m.; decl. on meridian, $4^{\circ} 31'$ S.: Sidereal Time at Sunset, 18h. 29m.